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Highly selective binding of methyl orange dye by cationic water-soluble pillar[5]arenes

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Abstract

© 2016 The Royal Society of Chemistry.A new water-soluble pillar[5]arene with an amide fragment and triethylammonium groups was synthesized by our original method of aminolysis of the ester groups. Using UV-spectroscopy, it is shown that cationic pillar[5]arenes are able to selectively form 1:1 complexes with some hydrophobic anions: the guests with bulky uncharged or negatively charged substituents hindering entry into the macrocycle cavity. Highly selective binding of the most lipophilic guest, methyl orange dye, in the form of organic anion salts by positively charged water-soluble pillar[5]arenes was detected. In the case of the azo dye the appropriate Kass values were 10-100-fold higher than those calculated for the other sulfonic acid derivatives studied. The 2D NMR NOESY 1H-1H spectroscopy confirms the formation of the inclusion complex: negative charge sulfonate head is outside the cavity of pillar[5]arenes and the hydrophobic fragment of the guest is located in the cavity.

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